

GERB monthly diurnal averages for Obs4MIPs

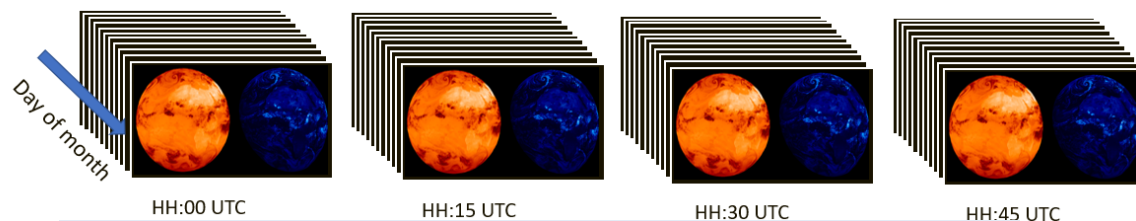
R Bantges, J Russell and H Brindley

Space and Atmospheric Physics Group, Imperial College London

With thanks to Alejandro Bodas-Salcedo (Met Office)

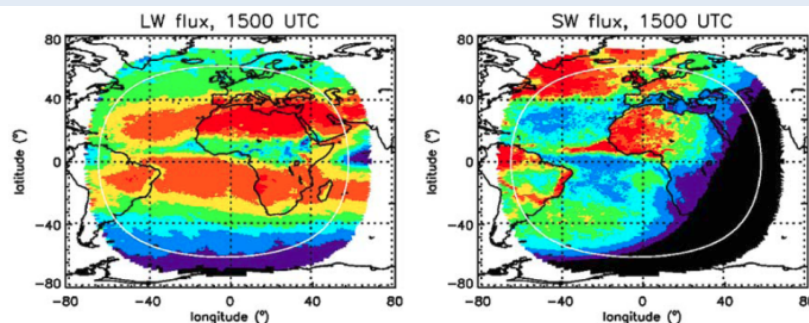
GERB Obs4MIPs product for CMIP6

GERB provides high time resolution broadband observations from geostationary orbit and up-to now only high time resolution flux products were available, with data product every ~15minutes.



GERB Ed1 products:
Monthly diurnal cycle ~3,000 HDF5 files
Variation over 5 years close to 15,000 files

96 OLR and 96
RSW gridded HR
products per day
(9km at
subsattellite
point)

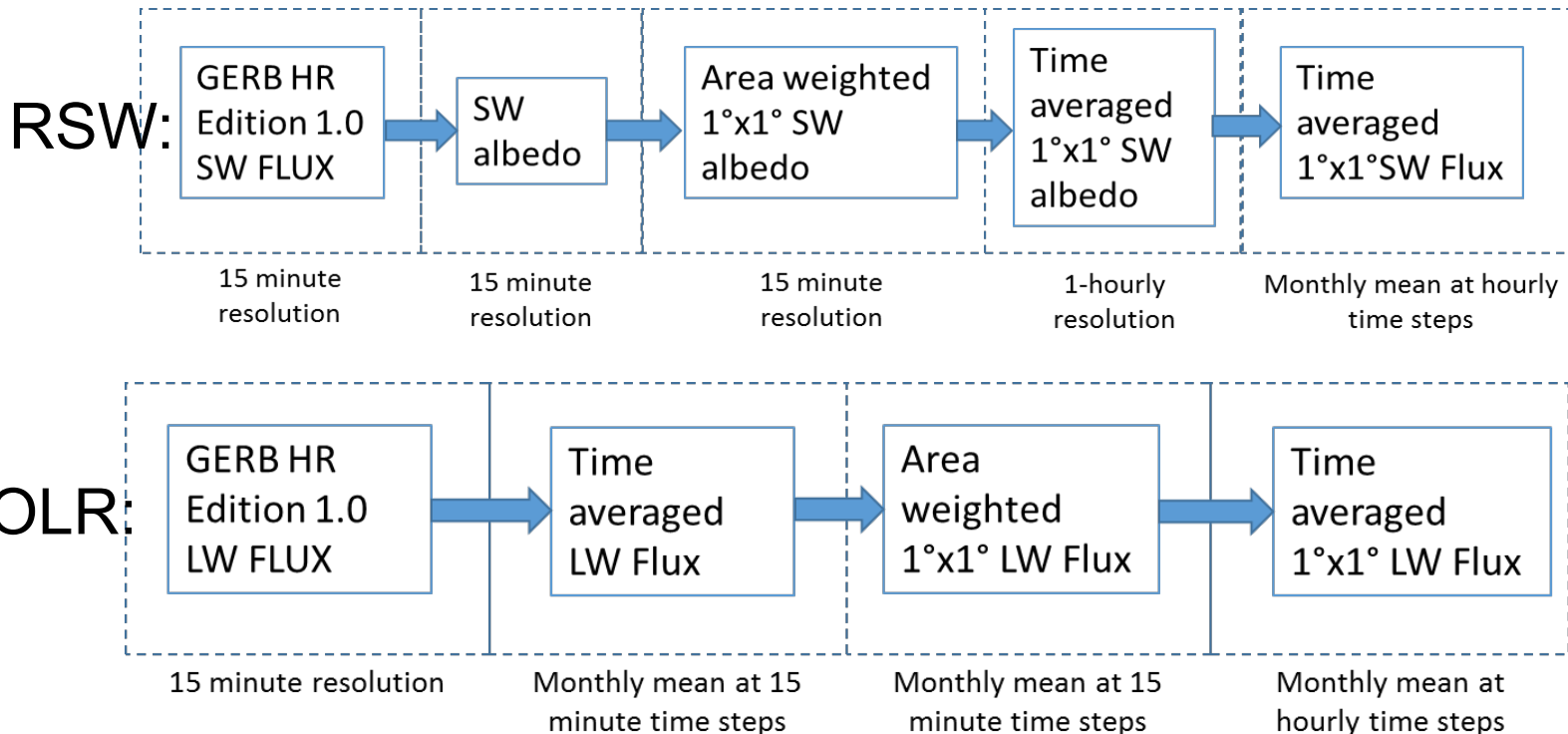
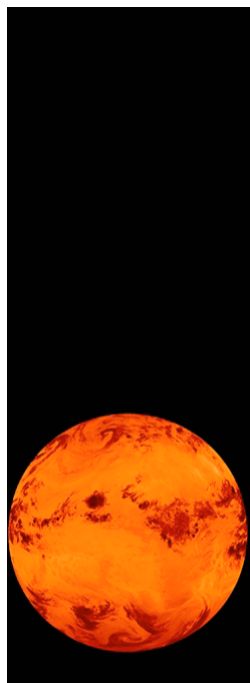


Averaged to 24
1°x1° monthly
hourly average

Monthly hourly average for the whole record in
netCDF file in the Obs4MIPs CMIP-6 format

15' instantaneous fluxes to monthly hourly averages

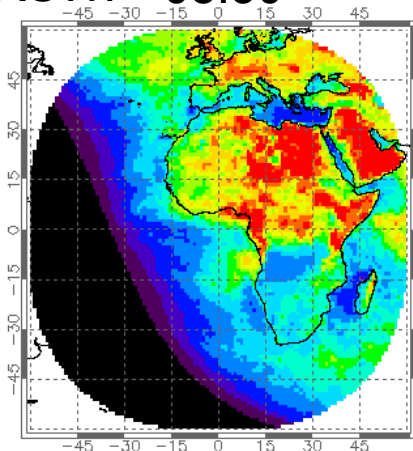
Input: GERB High Resolution (HR) – enhanced resolution (9 x 9 km at nadir) - 15 min time scale – designed to produce averages from. Available from CEDA.



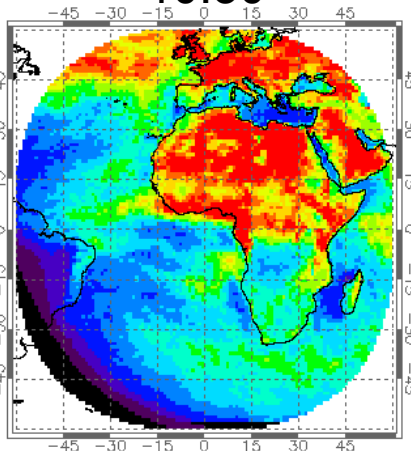
Monthly hourly average products

June 2008

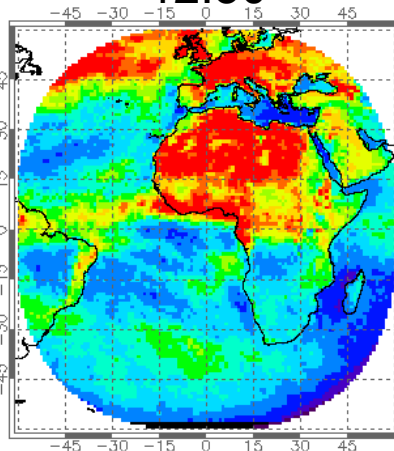
RSW: "08:30"



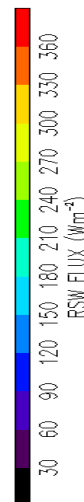
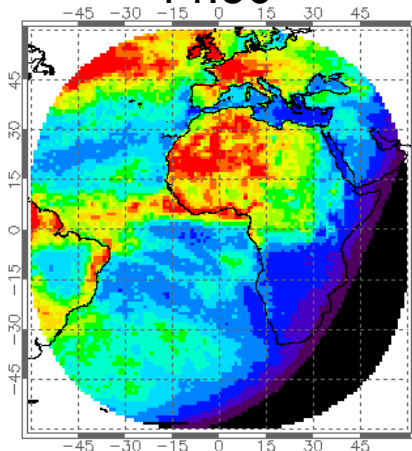
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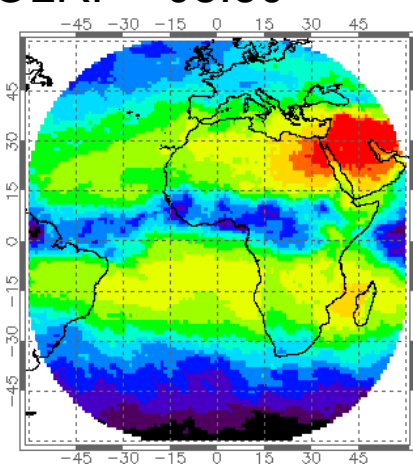
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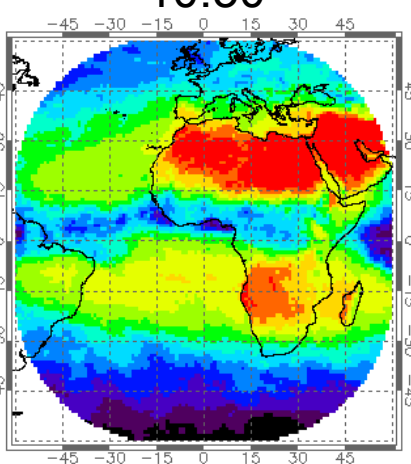
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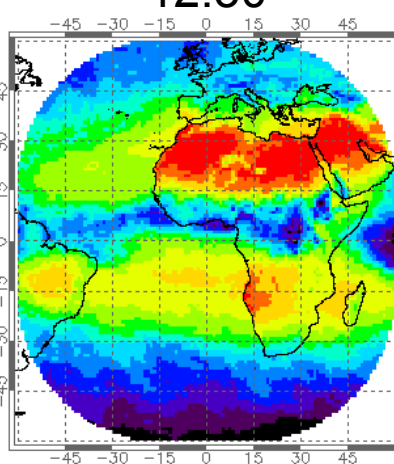
OLR: "08:30"



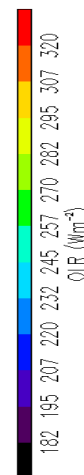
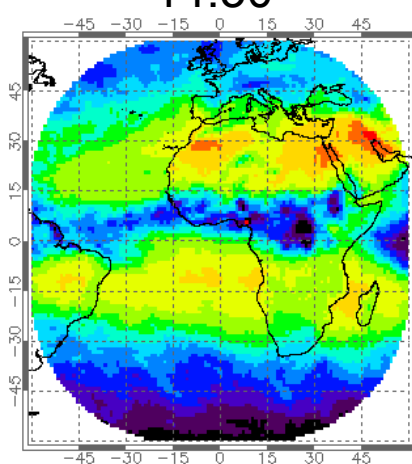
"10:30"



"12:30"

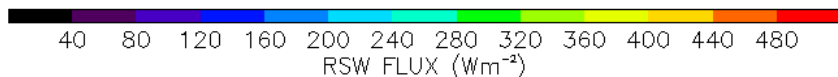
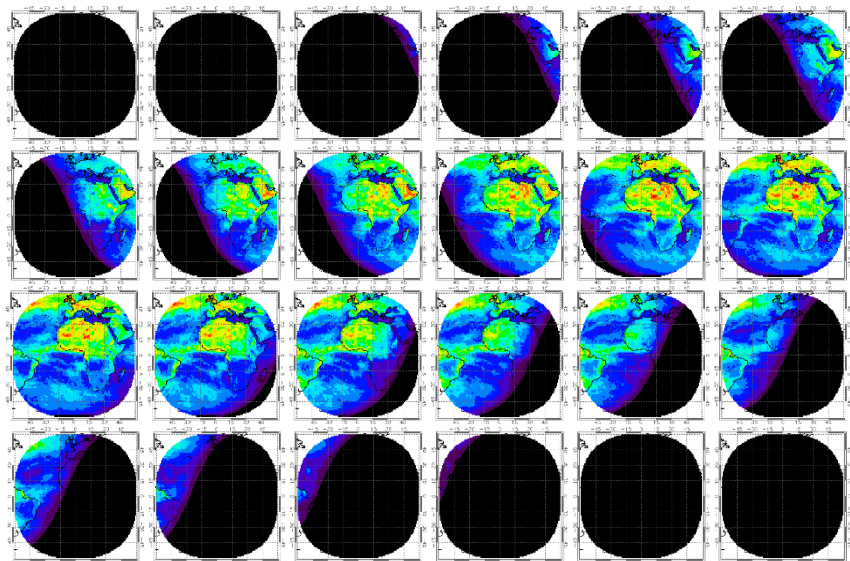


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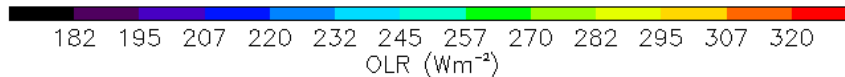
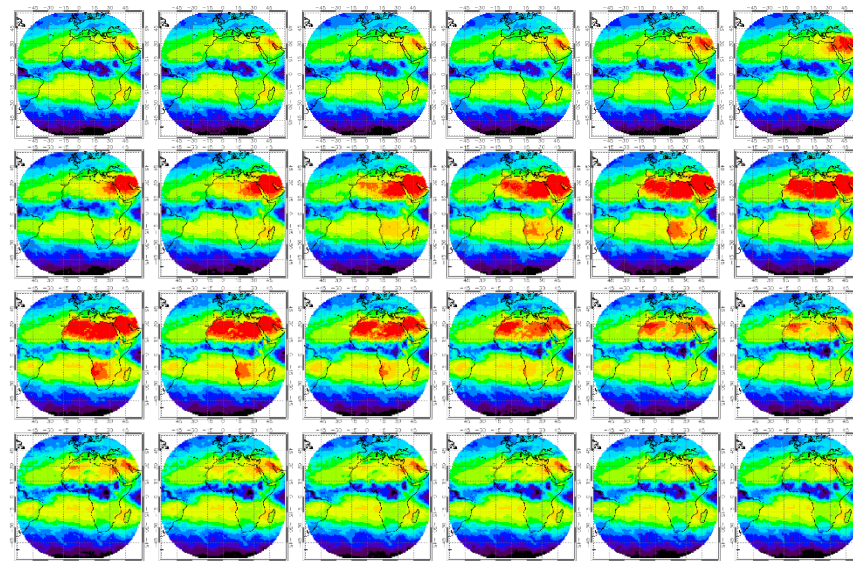


Full June 2008 product contents

RSW: JUNE 2008



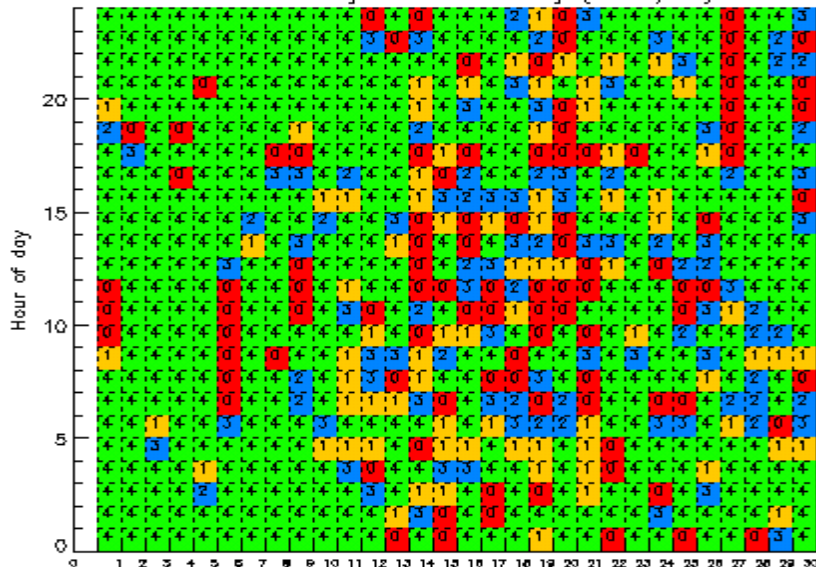
OLR: JUNE 2008



- GERB 1 from 05/2007 – 12/2012 (available now)
- Monthly averaging restricted to: Jan., May, June, July, Nov., & Dec.
- Data written in CF 1.7 (ODS 2.1) compliant netCDF (driven by obs4MIPs for CMIP6)

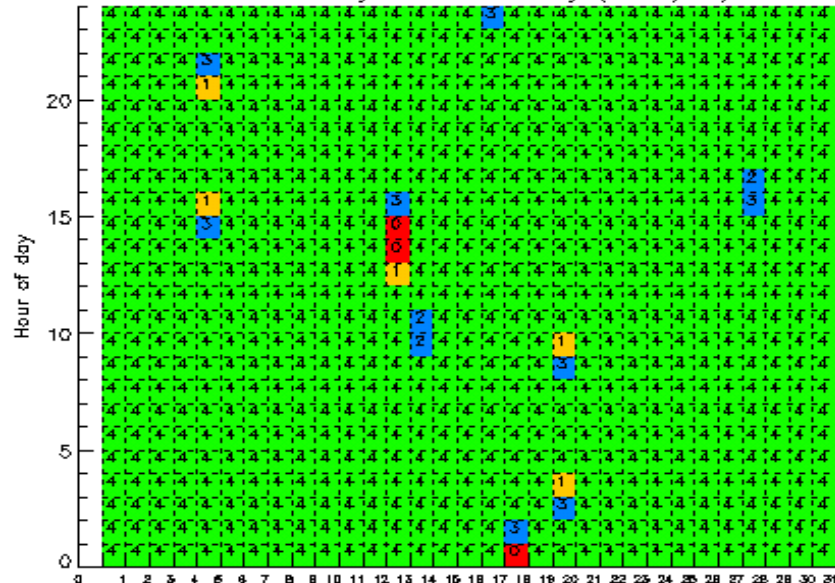
Effect of missing observations

GERB-1 hourly data availability (2012/06)



June 2012
(~4% data missing)

GERB-1 hourly data availability (2012/12)



December 2012
(~0.3% data missing)

Effect of missing days on monthly hourly average

- 1 day

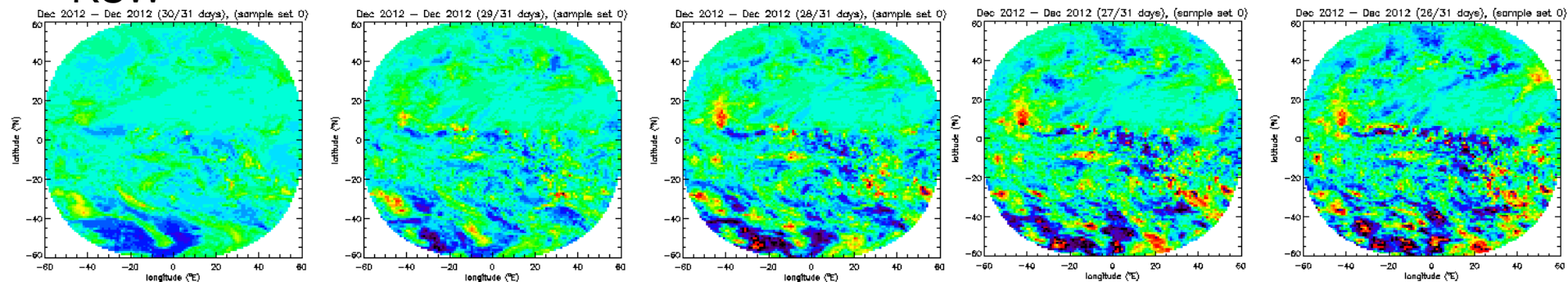
- 2 days

- 3 days

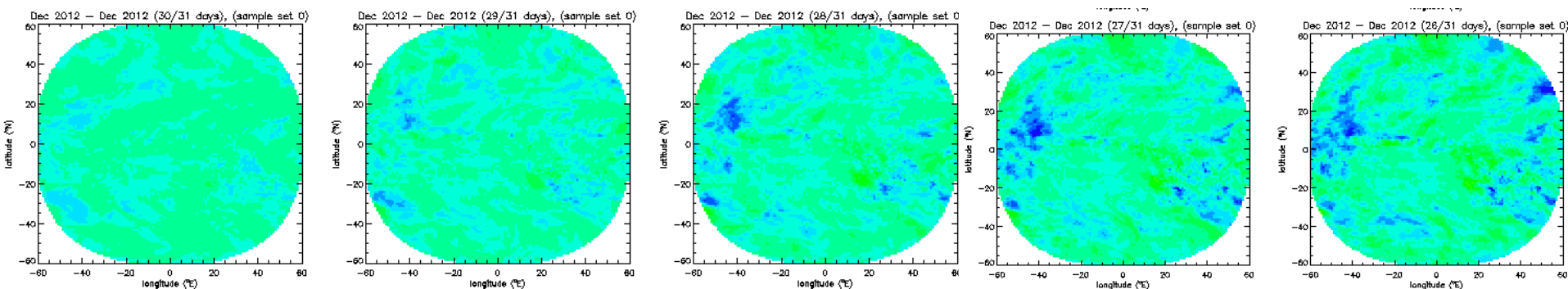
- 4 days

- 5 days

RSW



OLR



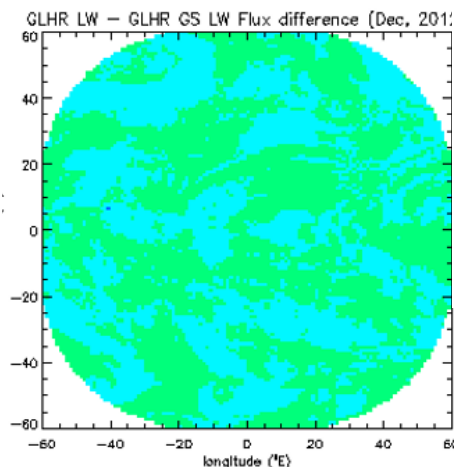
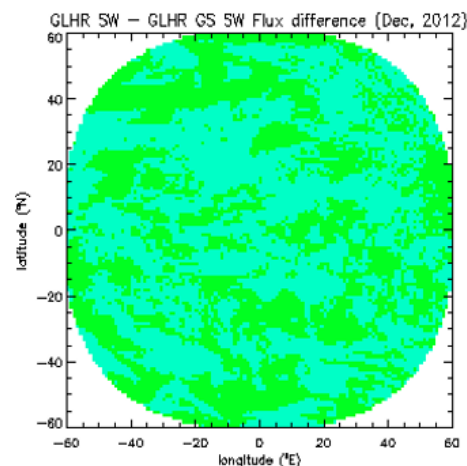
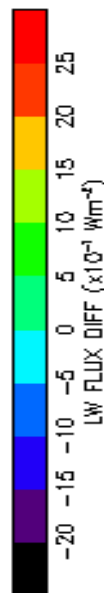
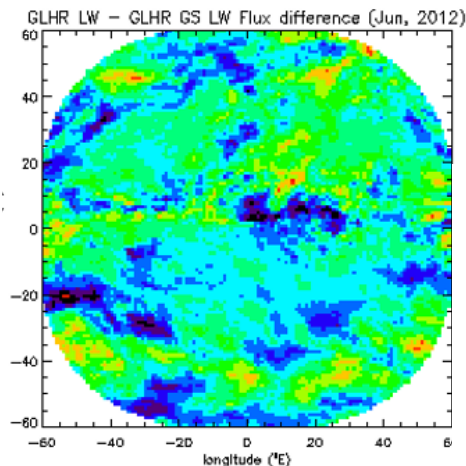
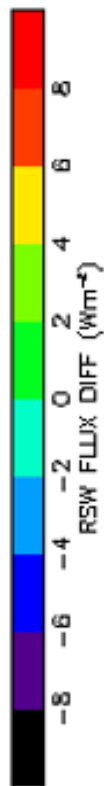
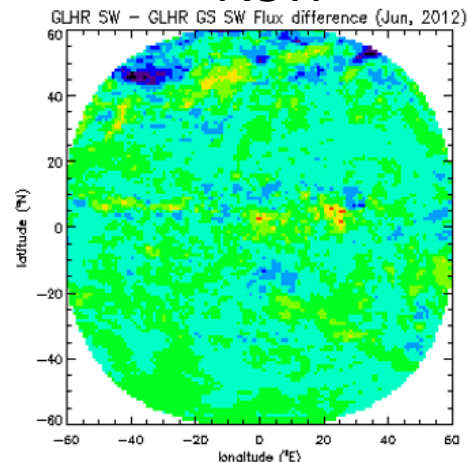
Dec 2012 11:30 UTC average

Products will indicate how
complete the input field

Uncertainty estimates (on monthly mean)

RSW

OLR



June 2012:

RSW uncertainties up to $\pm 6 \text{ Wm}^{-2}$

OLR uncertainties up to $\pm 2 \text{ Wm}^{-2}$

Dec 2012:

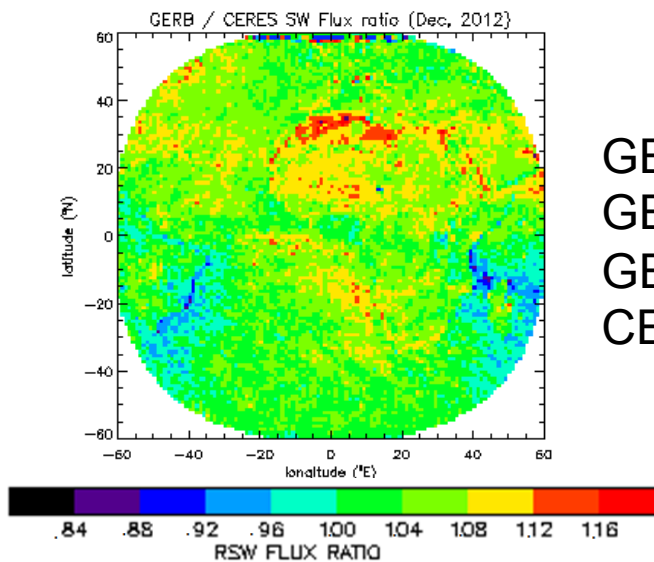
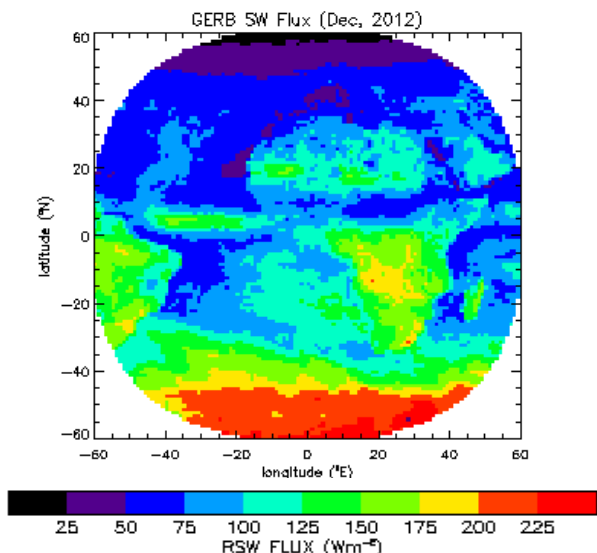
RSW $< \pm 1 \text{ Wm}^{-2}$

OLR $< \pm 0.5 \text{ Wm}^{-2}$

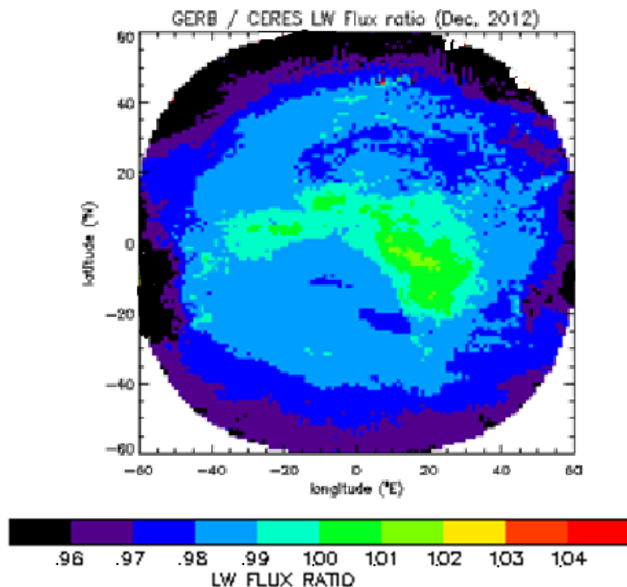
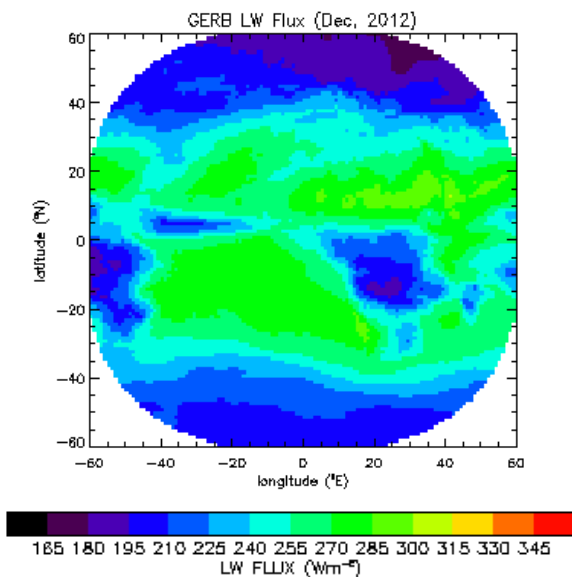
Use synthetic data to provide personalized uncertainty estimates for the actual patterns of missing data that occur in the product

NOTE DIFFERENT SCALES!

Comparison with CERES Ed4 EBAF (monthly mean)



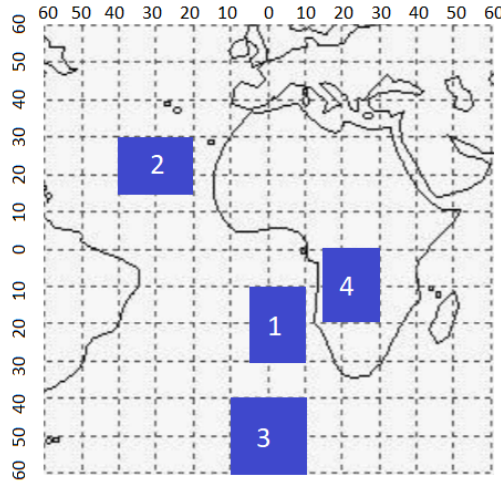
GERB RSW adjusted to
GERB-2 level (+5.5% c.f.
GERB-1 and +5.4% c.f.
CERES EBAF Ed4)



GERB OLR 2% lower CERES
on average. GERB ED1 LW
radiance to flux artefacts
visible: Cold cloud and limb
darkening.

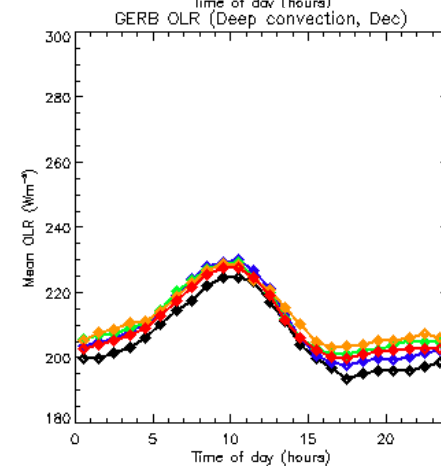
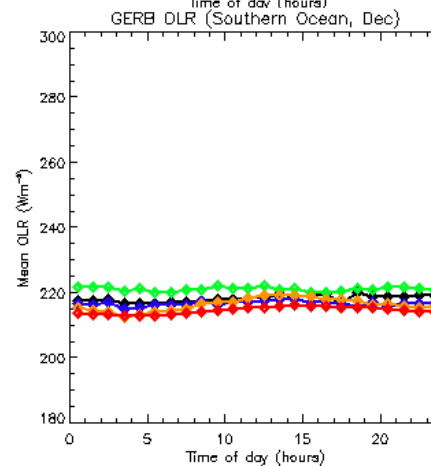
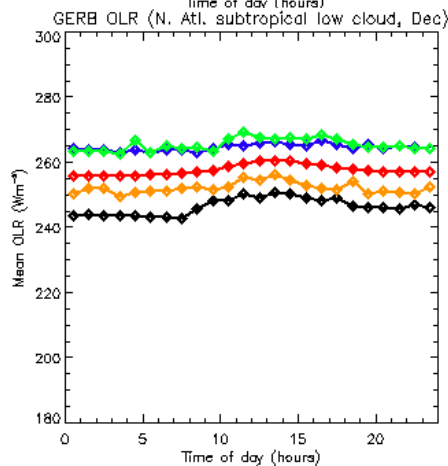
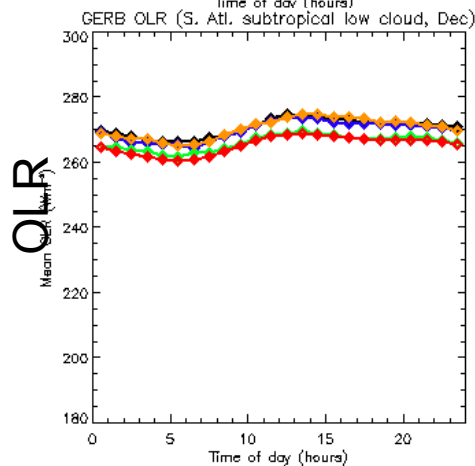
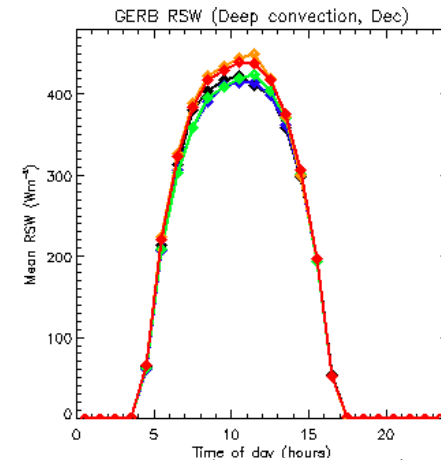
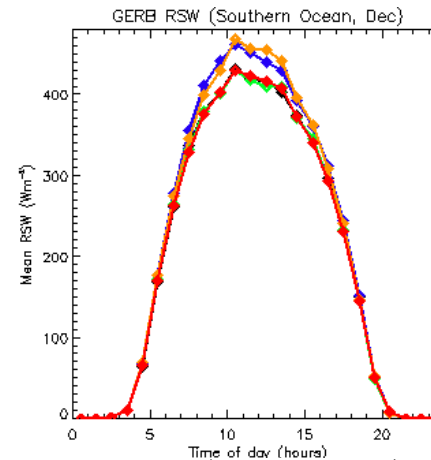
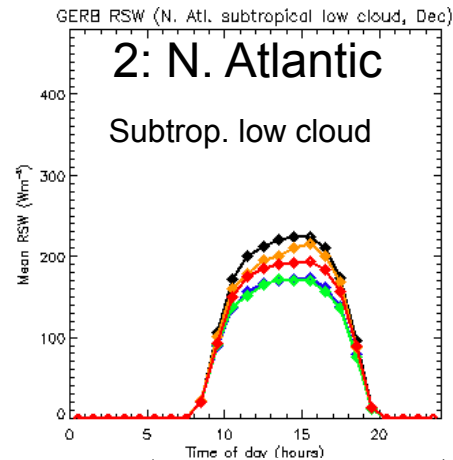
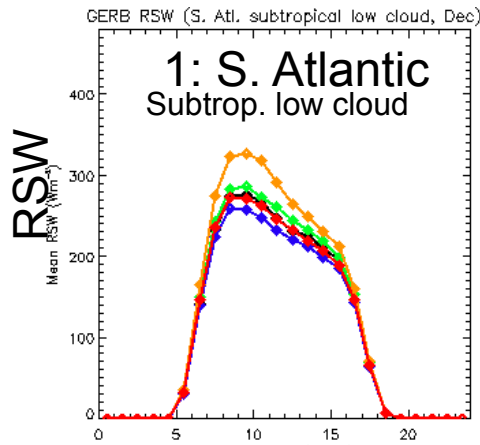
Average GERB/CERES
stable over record

Example regional diurnal cycles (Dec 2008 to 2012)

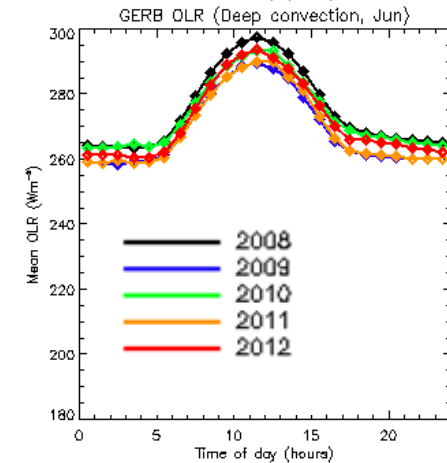
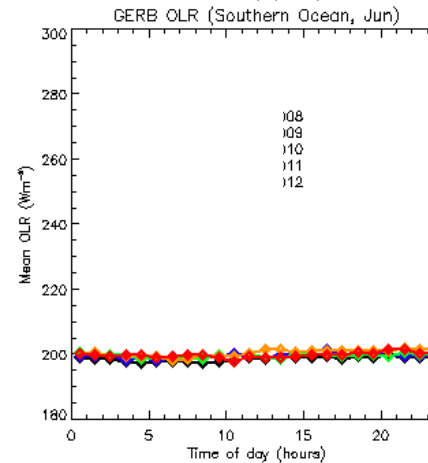
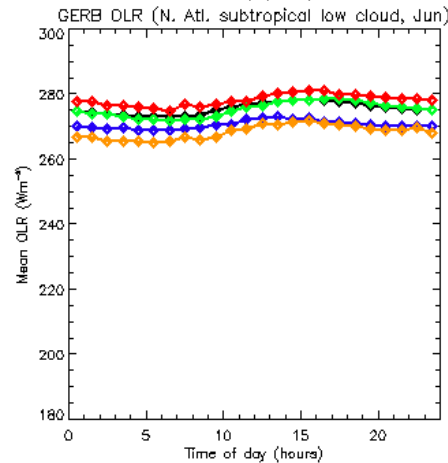
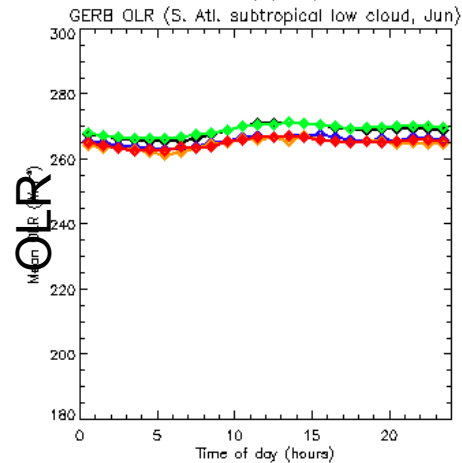
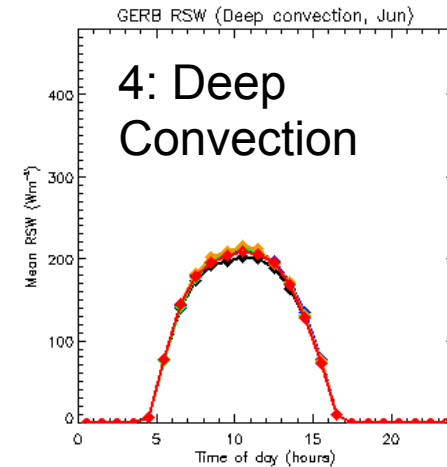
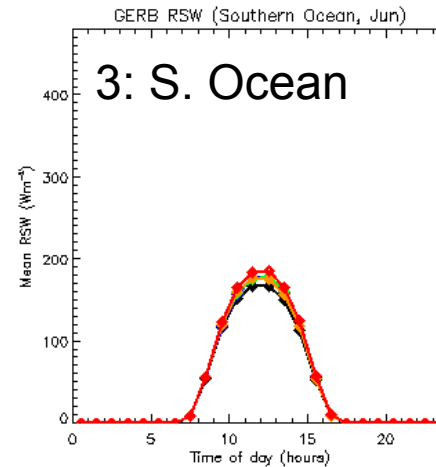
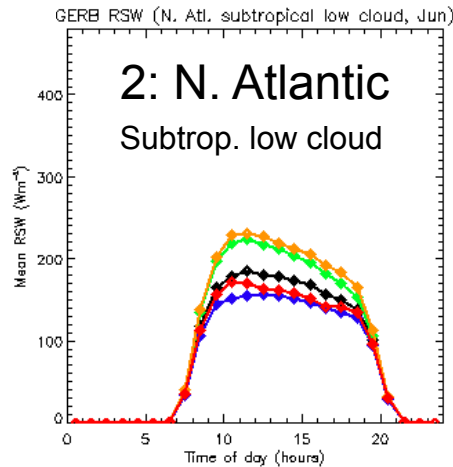
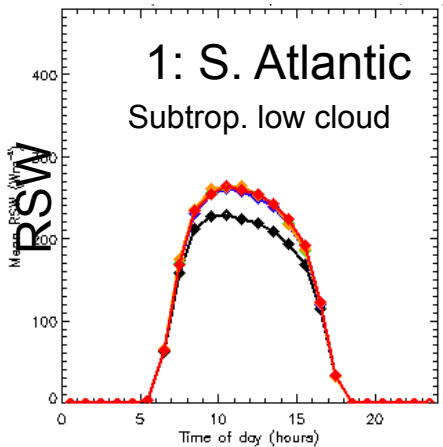
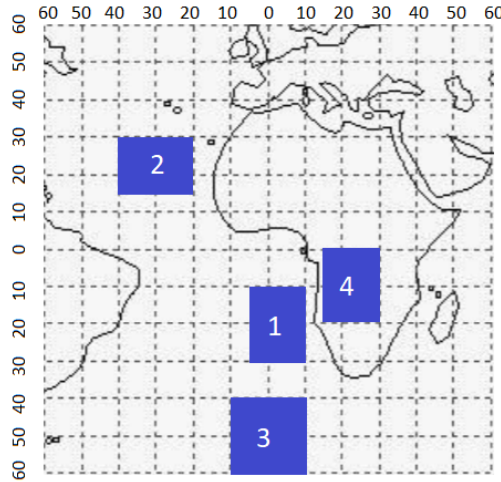


3: S. Ocean

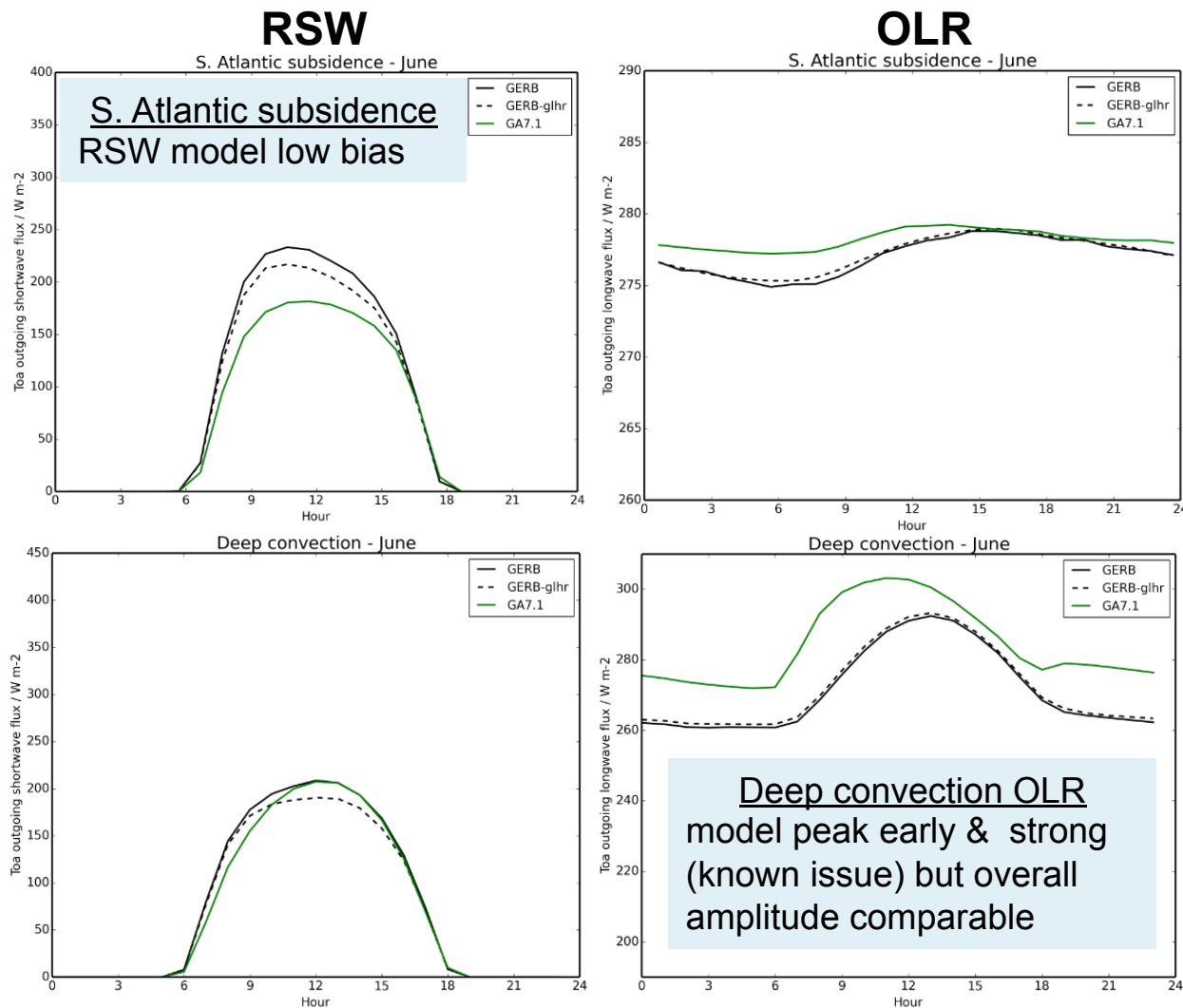
4: Deep Convection



Example regional diurnal cycles (June 2008 to 2012)



GERB & UM (June)



Plots courtesy of Alejandro Bodas-Salcedo (Met Office)

Summary

- GERB-1 monthly hourly average RSW and OLR have been produced on $1^\circ \times 1^\circ$ grid and are available directly from GERB Team at Imperial (gerb@imperial.ac.uk), also obs4MIPs (soon)
- These data provide easier access if you are interested in monthly averages and give hourly resolution allowing the diurnal cycle to be resolved. (grid-level uncertainty estimates also provided)
- May 2007 to December 2012 (Jan, May, June, July, Nov, Dec),
• 2004 to 2007 (GERB-2) coming soon
- Comparisons made with other independent instrument records (e.g. CERES EBAF Ed.4) full uncertainty analysis and initial comparisons with UKMO UM to be submitted for publication shortly.

